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DINOSAURS

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By Marie Halun Bloch

Illustrated by George F. Mason

Published by Scholastic Book Services, a division of Scholastic Magazines, Inc., New York, N.Y.

TO MY MOTHER

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6th printing . . . . . January 1964

A Letter From the Artist

Dear Boys and Girls:

No one really knows what a dinosaur looked like. My pictures, like all pictures of dinosaurs, are based on the reconstructions of dinosaurs you see in museums. And those reconstructions are based on the fossil bones and tracks of dinosaurs that really lived and walked on earth.

I worked at the American Museum of Natural History in New York City for 25 years, and I'd see those great dinosaur reconstructions almost every day. I got to know them so well I'm not sure I'd have been surprised if I heard one say, "Good morning, Mr. Mason."

As I worked on the pictures for this book, I sometimes wished those museum dinosaurs could walk around and pose for me. You see, one of my problems was: how did a dinosaur move? No one really knows that, either. My ideas about that are based on the movements of reptiles that live today because scientists believe that some dinosaurs resembled present-day lizards.

What would a dinosaur say if he saw my pictures? Well, I'd be satisfied if he said, "Not a bit flattering, Mr. Mason, but a pretty good resemblance."

George F. Mason

THE world is full of people. They live on deserts and in jungles, on mountains and plains. They live all over.

But millions of years ago, when there were no people on earth, the world was full of reptiles instead. Dinosaurs, members of the reptile family, swarmed over the lands. Dinosaurs wallowed in the swamps. Serpents swam the seas and flying reptiles soared in the air. Even the few other kinds of animals, such as the first birds and the first of the furry animals, in some ways were like reptiles.

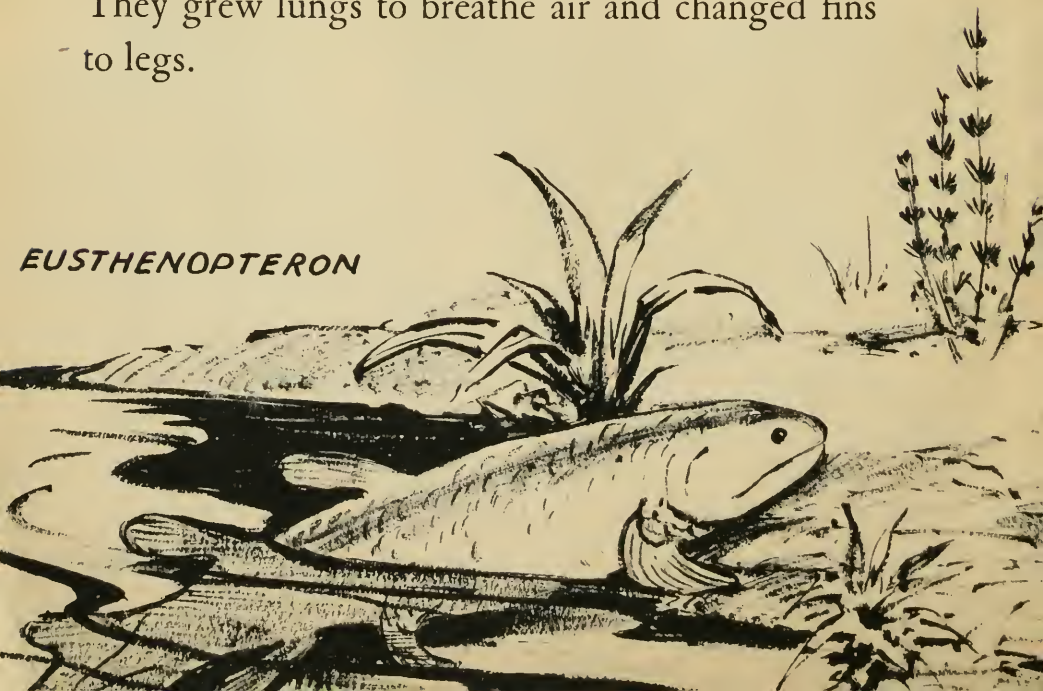
How did it come about that reptiles were once the most important animals on earth?

The story can begin about 400 million years ago. By that time the earth was four billion years old, and plants and animals were already living in the oceans.

The lands were bare. But some plants were struggling out of the seas and were making themselves over for life on land.

They had to change from limp weeds to stalks that could stand up. To keep from drying, they had to learn to send roots into the soil for water.

Later, when a few plants were growing on the beaches, some fishes sought a life on land too. They grew lungs to breathe air and changed fins to legs.

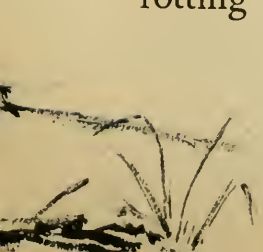


By the time 100 million years had passed, the naked earth was clothed in green plants. In those first forests lived amphibians, animals that spent most of their lives on land even though they were born in water.

It was summer all the time. Around great swamps grew forests of tree ferns. Mosses and delicate ferns carpeted the forest floors. Horsetail rushes grew tall along the sluggish creeks. These plants no longer needed to live in water. But they did have to live close to flowing water so that new plants could start growing from the spores of the old plants.

Here and there, a new kind of tree was already growing. It was a cycad (SI-kad) and grew from seeds instead of spores. The seeds did not need flowing water to start growing. Cycads were free to grow anywhere.

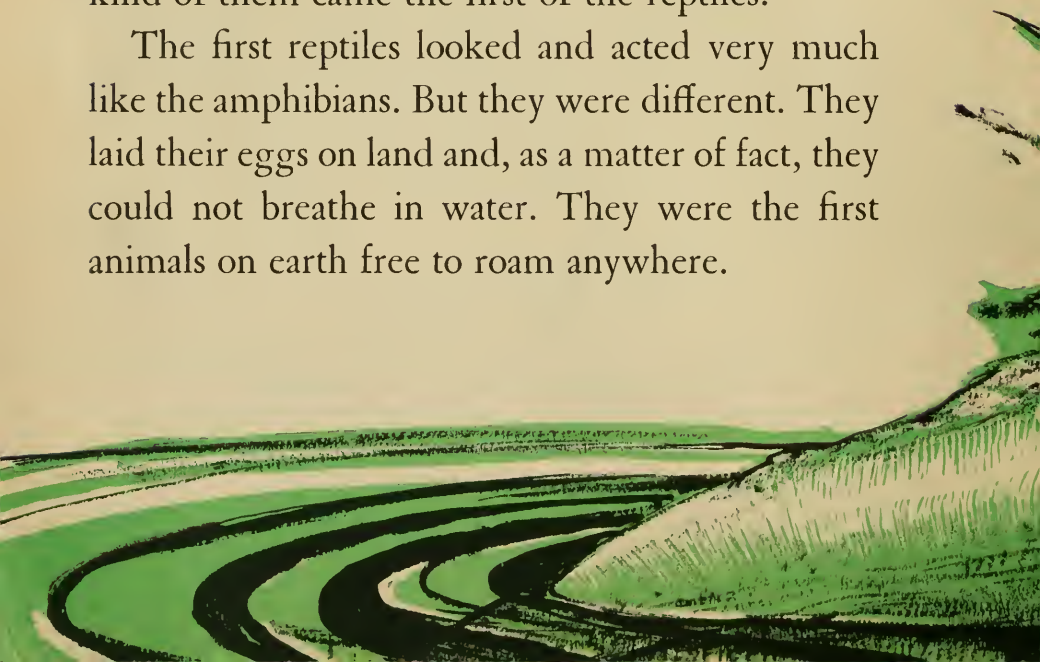
In among the trees flitted giant dragonflies. Cockroaches, as big as your hand, scuttled in the rotting underbrush.



In this green and quiet world lived the amphibians. Their ancestors were the fish that had crawled out of the seas to try to live on land. Like most of the plants, these animals still lived a double life, partly in water, partly on land. They were born in water as tadpoles. As they grew, they developed lungs and could breathe air, so they crawled out to live on land. But they always went back to water to lay the eggs out of which new tadpoles hatched.

Those fat and lazy amphibians were the grandfathers of a mighty race of animals. For, from one kind of them came the first of the reptiles.

The first reptiles looked and acted very much like the amphibians. But they were different. They laid their eggs on land and, as a matter of fact, they could not breathe in water. They were the first animals on earth free to roam anywhere.



ICHTHYOSTEGALIAN

The world seemed to be a lazy, quiet place. But the earth is always changing.

A mighty force which people do not yet quite understand began to press against both sides of the continents. The earth's skin, along some weak places, was squeezed up into giant folds, and mountains were made.

In a long chain from Newfoundland all the way to Alabama, the Appalachians wrinkled up. As the lands were rising, the swamps began to drain off. The weather became colder and drier.

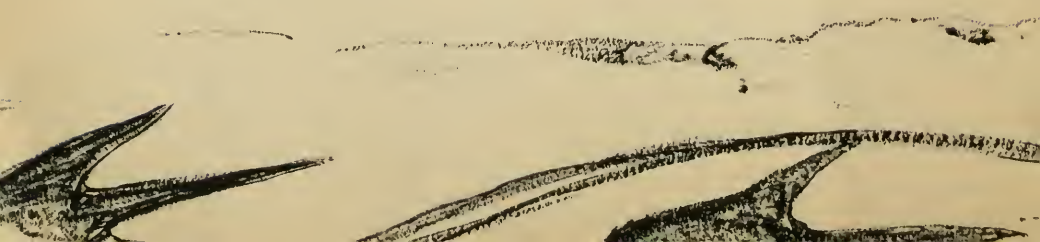
This took millions of years to happen.

When that mountain-building time ended, the long-lasting summer was gone. Gone were the swamps edged with giant tree ferns and tall rushes.

Gone, too, were the amphibians.

But some of the reptiles managed to live.

From one kind of these, a two-legged creature with small hands, came the first dinosaurs.



Some of these dinosaurs, small and lively, ran about the mud flats of the Connecticut Valley. Later, the mud, tracked all over with their birdlike footprints, turned to stone. Nowadays, many people in New England have walks and terraces of flagstone in which these dinosaur footprints can still be seen.

Gradually, after the first dinosaurs appeared, the earth was becoming a more comfortable place on which to live. Frost and wind and rain were wearing the mountains down, and the weather became warmer and rainier all over the world.

The Arctic Sea came washing down into western America. When it flowed back, it left behind great puddles of swamps and lakes.

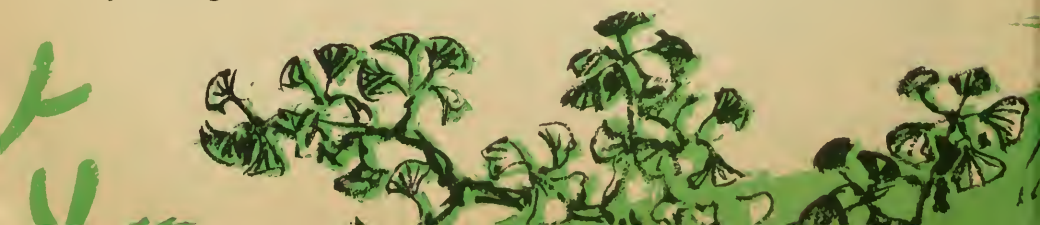
This new world suited the once small race of dinosaurs. Now, many different kinds lived far and wide over all the lands of the earth.

It was a world of reptiles.

In the uplands of what people now call Colorado, South Dakota, Wyoming, Oklahoma and Utah, cycads, with big and showy flowers, grew everywhere. There were sparse woods of cypress and ginkgo trees, too.

The first birds, about the size of small crows, were already flapping from tree to tree. Their ancestors had been reptiles, so it is no wonder that they had long reptilian jaws full of reptilian teeth. They had long reptilian tails, but decorated with feathers. Only their feathers show that they were birds. And even those had developed from reptilian scales.

No songs filled the woods, for birds could not yet sing.

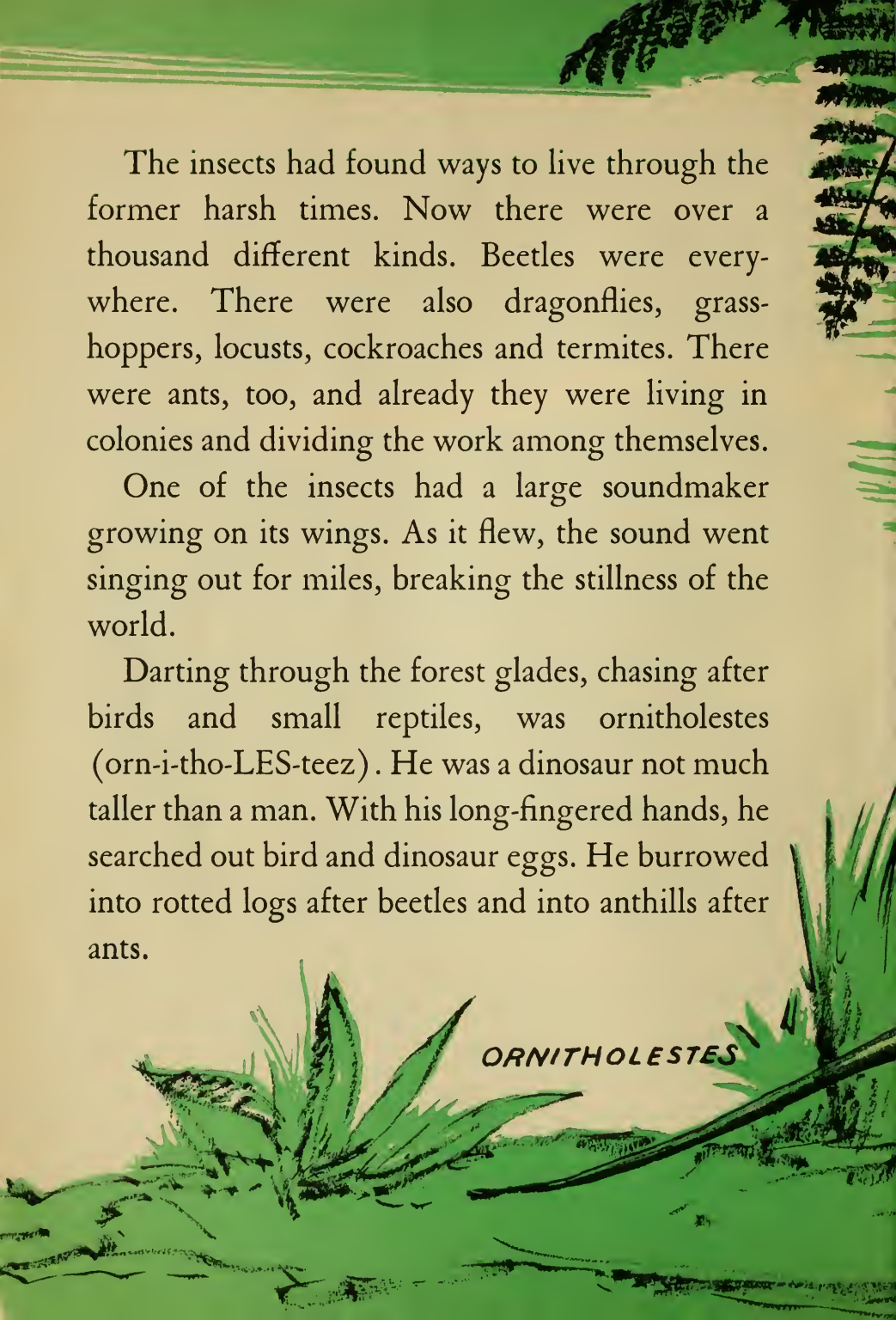


RHAMPHORHYNCHUS

The insects had found ways to live through the former harsh times. Now there were over a thousand different kinds. Beetles were everywhere. There were also dragonflies, grasshoppers, locusts, cockroaches and termites. There were ants, too, and already they were living in colonies and dividing the work among themselves.

One of the insects had a large soundmaker growing on its wings. As it flew, the sound went singing out for miles, breaking the stillness of the world.

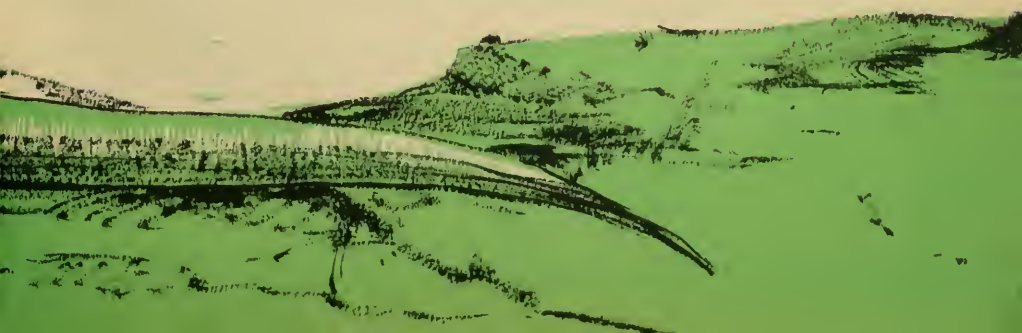
Darting through the forest glades, chasing after birds and small reptiles, was ornitholestes (orn-i-tho-LES-teez). He was a dinosaur not much taller than a man. With his long-fingered hands, he searched out bird and dinosaur eggs. He burrowed into rotted logs after beetles and into anthills after ants.



ALLOSAUR

In the secret places of the forests—in hollow logs or under bushes and among tree roots—lived a new race of animals, the mammals. They were furred creatures, some of them hardly bigger than mice. Their ancestors had been reptiles that had lived in the time of the amphibians. Like their ancestors, most of the mammals still laid eggs. But the young of some mammals even then were born alive rather than hatched from eggs. To look at them, one would not have thought it, but one day this race of animals would own the earth. In the meantime, though, they were hardly worth noticing.

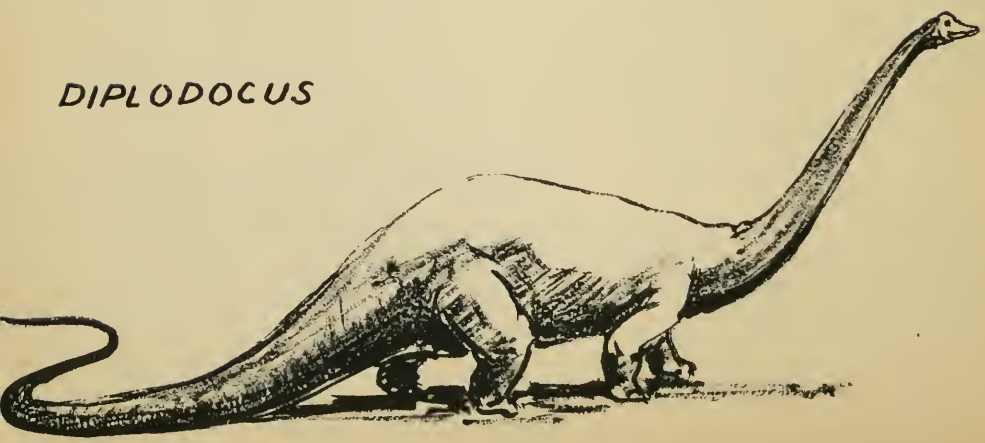
Lord of the uplands was fierce allosaur (AL-lo-sawr). When he could not find meat enough among the smaller dinosaurs of the forest, he lumbered down to the marshes for a tasty meal of swamp dinosaur.

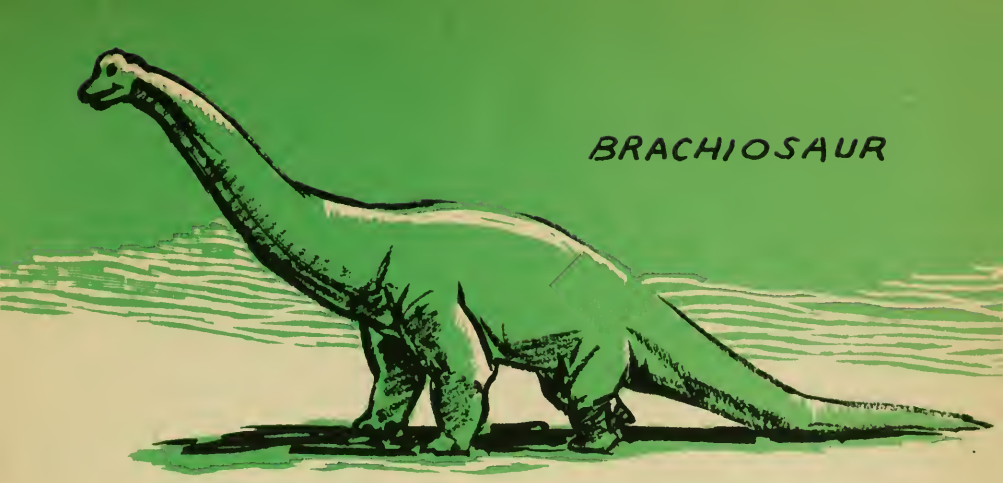


Along the swamps and slow rivers that threaded through the great stretches of low land between the forests, grew horsetails and jungles of ferns. In some of them lived turtles and crocodiles. They were new relations of the dinosaurs.

But the most noticeable animals of the swamps were dinosaurs that were six times heavier than an elephant.

There were several different kinds of these swamp dwellers. Brontosaur (BRONT-o-sawr), diplodocus (dip-LOD-o-kus), and brachiosaur (BRAK-i-o-sawr) are the names of some of them. They were all much alike.





Brontosaur's long snaky neck ended in a head so small that it looked silly. Inside that head was a brain no heavier than a grapefruit.

There was so much of him and so little brain to manage it all that inside his hips he had a kind of helping "brain." This was a swelling of the nerves in his backbone, but it was twenty times bigger than his real brain. It probably had charge of making his hind legs and tail move.

Even with two "brains," brontosaur was a stupid creature. Much of the time, his body buoyed up for him by the water, he lay half asleep in his home swamp, all but his nostrils covered. When he roused to feed, he didn't need to move a step, for he was floating in the middle of his dinner.

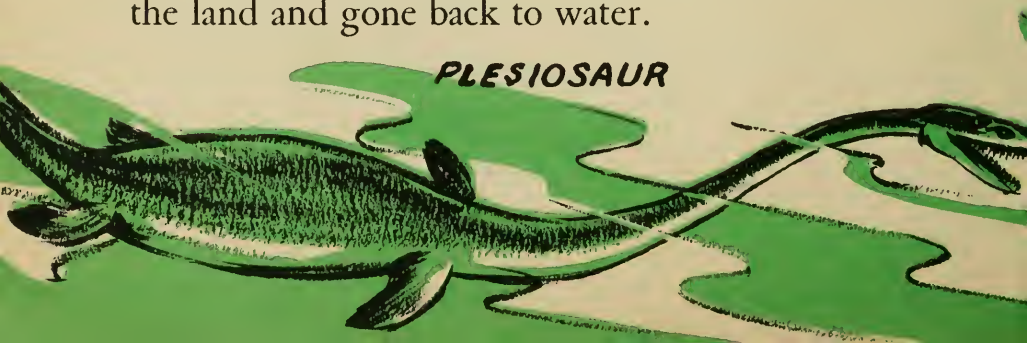
Moving his head from side to side, through his teeth he sucked in the tangle of floating weeds. He did not even need to chew his food. Instead, he swallowed stones that ground it up after it had reached his stomach.

Not often did brontosaur venture onto dry land, except perhaps to lay eggs. But now and then he did rise up out of the steaming swamp. At his hips he stood as high as a one-and-a-half-story house. From snout to tail tip he stretched as long as the biggest whale.

As soon as allosaur appeared on the horizon, brontosaur went sloshing out of reach to the middle of his swamp. But sometimes he was not quick enough.

When allosaur ate, he dropped down on all fours and used his clawed hands and sharp teeth to tear off chunks of meat.

Even with allosaur stalking about, the lands were peaceful enough. The ferocious places were the seas. They were ruled by reptiles that had left the land and gone back to water.



The terror of the seas was ichthyosaur (IK-thee-o-sawr). His legs had become paddles. As his streamlined body zipped through the water, he looked more fish than lizard. But since he was not really a fish, he had to come up for a gulp of air once in a while.

Plesiosaur (PLEES-i-o-sawr), bearing his long snaky neck high over the water, paddled on the open seas with four flippers that had once been legs. Seeing a fish, he dipped his head down and snatched it with his sharp teeth.

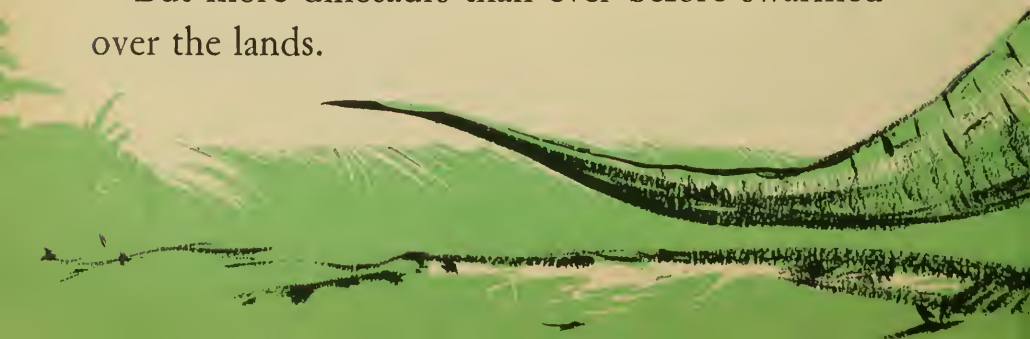
Slowly, along the west coast of America, a weak length in the earth's crust began to buckle up in folds. Mountains were formed. We call them now the Sierra Nevadas, the Cascades and the Coast Ranges.

Several million years later, the Arctic Ocean again came slowly lapping down from the north, blotting out the swamps. It finally met and mingled with the waters of the Gulf of Mexico, which had been spreading up from the south. Now a vast, shallow sea covered almost all of western America.

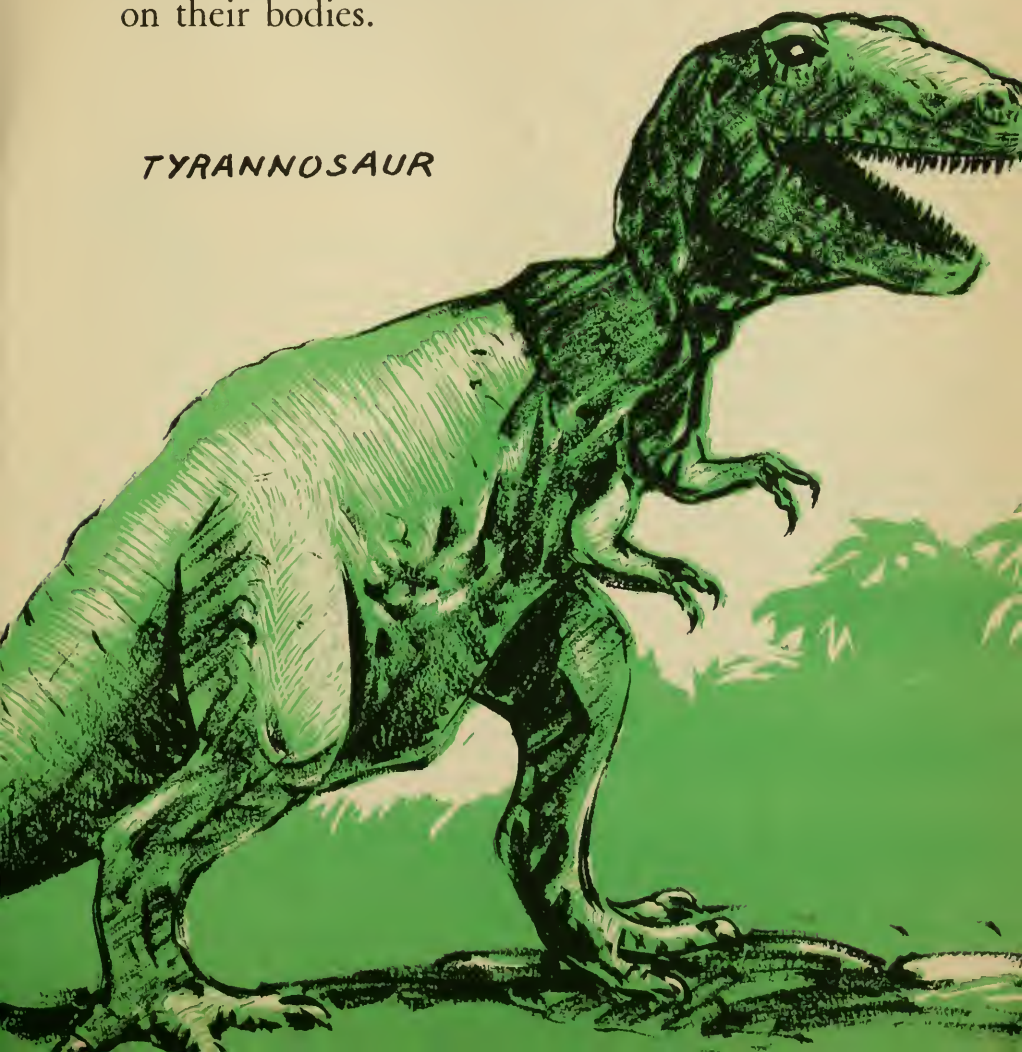
This sea did not stay long—only a few million years. For all the land had slowly begun to rise, draining the seas back into their basins.

By this time brontosaur and all his tribe, their swamps long gone, were few and far between. Fierce allosaur, too, had disappeared.

But more dinosaurs than ever before swarmed over the lands.



Ferocious times had come. For tyrannosaur (ty-RAN-o-sawr), the most terrible dinosaur of them all, now stalked the earth. To protect themselves, many of the plant-eating dinosaurs had all sorts of fantastic armor growing on their bodies.



The plant world, always the first with the new, was trying out unusual forms too. Now there were stands of elms, oaks, maples and willows. Magnolias and tulip trees, fig, beech, persimmon and other flowering trees began to grow in place of the cycads. Now the forest green was splashed with pinks and yellows and white.

As if in response to the bright flowers, bees appeared for the first time, humming along from blossom to blossom.

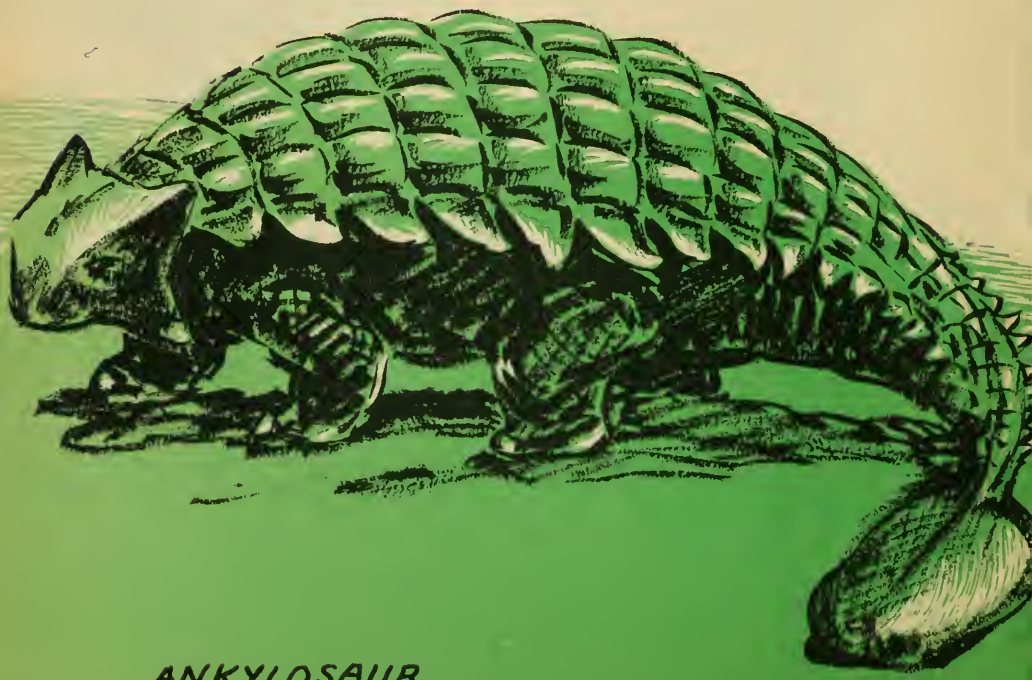
In the forests of what is today Colorado, Wyoming and Montana lived struthiomimus (strooth-i-o-MIME-us), a dinosaur whose body (not including his legs and neck) was not much bigger than a dog's.

He was a cousin to tyrannosaur. But most of the dinosaurs had little to fear from him. Running through the forest on his birdlike feet, he looked like a plucked ostrich with a very long tail. His tiny head had not a tooth in it—and not much brain either. With the three long curved claws on

his hands, he cracked open eggs, picked fruits and seeds off trees, and burrowed into the underbrush after beetles and other insects.

When he heard suspicious sounds in the woods behind him, struthiomimus bounded away through the trees. For the noises could mean that tyrannosaur was coming.

Ankylosaur (an-KY-lo-sawr), a plant eater, had a great club of solid bone on the end of his tail. This was handy for whacking his smaller enemies. But when tyrannosaur came striding into view, ankylosaur either curled up tight like an armadillo or flattened out on the ground, hoping to be safe under the overlapping bony plates that armored his body.



ANKYLOSAUR

Tribes of a three-horned dinosaur named triceratops (try-SER-a-tops) lived in the woods too. Most of the time they browsed peacefully enough among the willows.

But should tyrannosaur come lumbering up to attack him, triceratops could be savage.

Stalking along on monstrous hind legs, tyrannosaur stood almost as high as a two-story building. Each of his small hands, dangling in front, was armed with two claws. His jaws, gaping wide, showed a hoard of teeth.

Triceratops, leaving his browsing, stood with his head lowered. Then with a sudden rush, he rammed his long horns into tyrannosaur's legs. With an upward jerk of his head, he gouged him with the short horn on his snout.

There were few tricks in tyrannosaur's great stupid head. When two tyrannosaurs met in battle, they roweled each other tooth and claw, tearing out great chunks of flesh. Flattening bushes and small trees with their thrashing tails, they struck terror into every animal for miles about.

Often at night, when the chilly air made the cold-blooded dinosaurs too sluggish to move, the tiny mammals ventured out of their hiding places to hunt for food. They weren't fussy. They ate what they could find.

In the lowlands, along the lakes and pleasant rivers lined with palms and ferns, fig and bread-fruit trees, magnolias and stunted horsetails, lived the duck-billed dinosaurs.

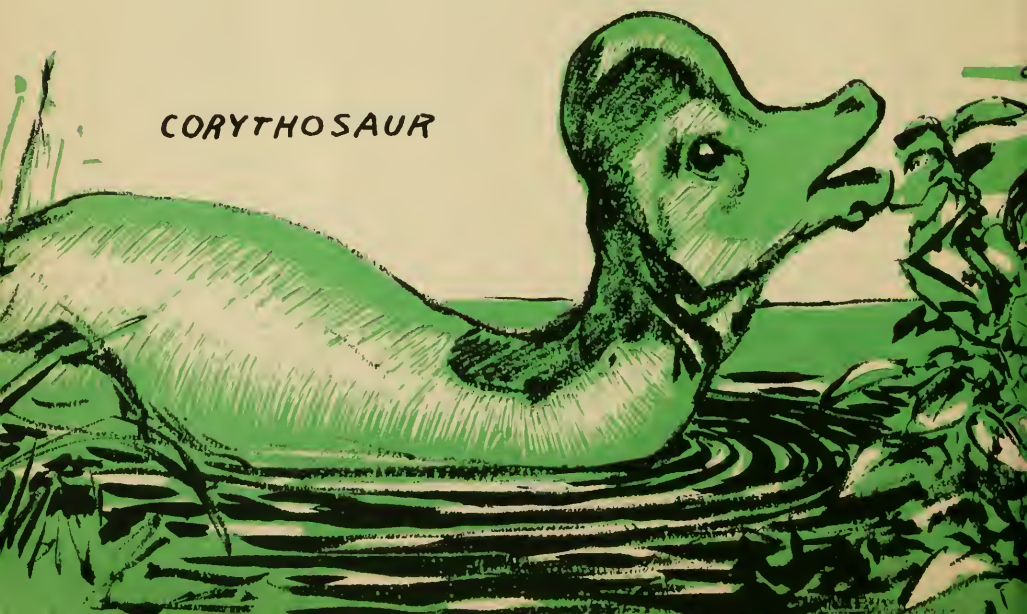
Trachodon (TRAK-o-don) dawdled along the shallows, cropping off the tough horsetail rushes with his duck bill.

Sandy stuff was mixed in with the rushes. This quickly wore out trachodon's teeth. But that didn't matter. As soon as a tooth wore down to its root, another underneath it promptly pushed up. For, underneath each of the teeth sticking out of his jaws was a vertical row of a dozen or so more. Altogether, trachodon had about 2,000 teeth in his head.

Whenever one of the fierce meat eaters took it into his head to invade the lowlands, trachodon splashed into the lake and, paddling with his webbed hands and feet, swam out of reach.

Among those sharing the lakes and streams with him was corythosaur (ko-RITH-o-sawr). Inside the crest on his head were empty spaces in which air could be stored. Whenever tyrannosaur appeared in the neighborhood, corythosaur swam out to the middle of the stream, took deep breaths to fill his crest with air, and submerged. He could hide under water for a long time without coming up for more air.

Pachycephalosaur (packy-SEF-a-lo-sawr) was another of the duck-bills. The many fancy knobs all over his head were probably useless. His brain was small, even for a dinosaur. But protecting it was a skull bone nine or ten inches thick.



PACHYCEPHALOSAUI

In what was left of that great sea that flooded the interior of America now swarmed the mosasaurs (MO-sa-sawrs). Like the other lizards that lived in the seas, they were descended from land reptiles. Swift, and as ferocious as tyrannosaur, they preyed upon the fishes.

Overhead, casting enormous moving shadows on the sea, glided flocks of pteranodon (ter-AN-o-don), the flying reptile. His wings were of very thin skin, like a bat's. From tip to tip they stretched as much as twenty-seven feet. Yet his body was no heavier than that of a medium-sized turkey.

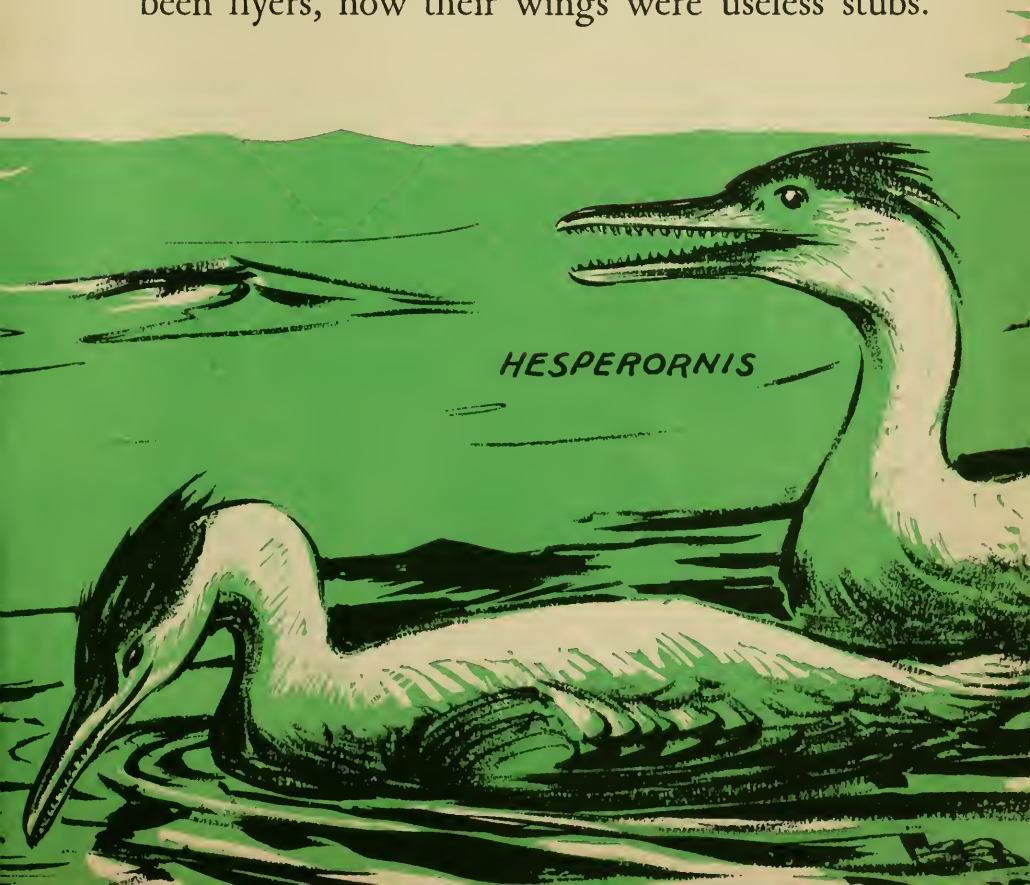
When he rested on the chalky cliffs edging the sea, he clung to them with three clawed fingers sticking out of his wings. His wings folded over his body like a paper sack.

PTERANODON
MOSOSAUR

ICHTHYORNIS

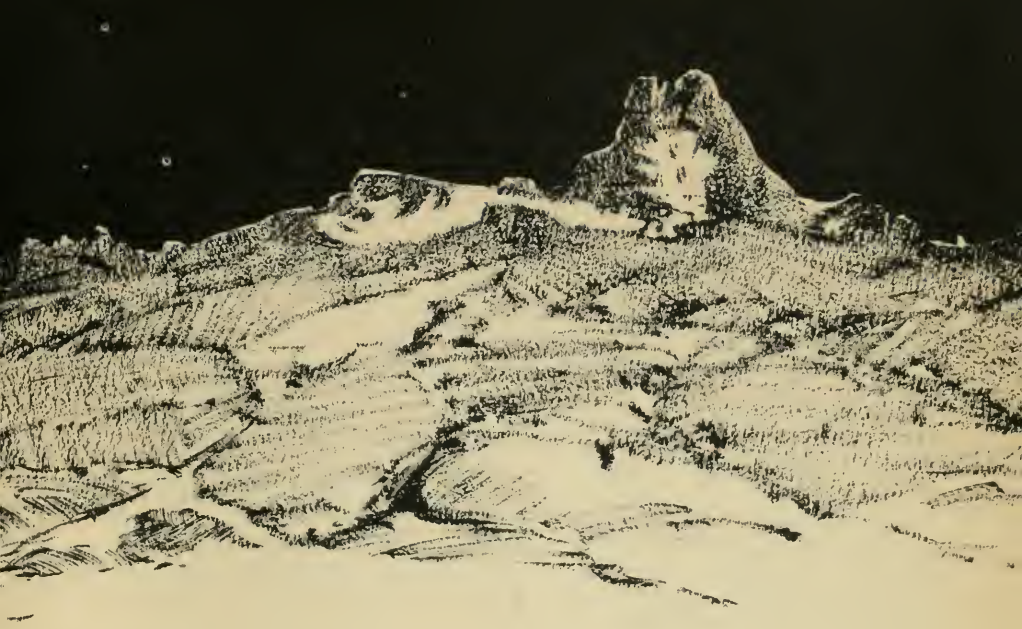
Flying and diving after fish were sea birds called ichthyornis (ik-thee-OR-nis). They were about as big as pigeons, with long necks, big heads and jaws full of teeth. Their wings were much stronger than pteranodon's.

Along the shore waters, paddling about and diving after fish, were big birds called hesperornis (hes-per-OR-nis). Although the family had once been flyers, now their wings were useless stubs.



Slowly that swarming sea was ebbing back into its two basins, in the Arctic and the Gulf. For the greatest mountain-building time of all had begun.

Along the old weak places the crust of the continents wrinkled up. In majestic folds the Rockies reared up, in some places almost three miles high. The folding stretched from Alaska down through North America. Then, with hardly a break, it continued for another 5,000 miles the length of South America, to form the Andes.



In Europe, the Alps rose up. In Asia, highest of all rose the Himalayas.

In North America, the land east of the Rockies bowed up in a high arch, making a plain almost a mile and a half higher than the oceans. Along the east coast the Appalachians humped up again, higher than before.

Winters came. Even glaciers formed in the folds of the new Rockies.

Long before that mountain-building time came to an end, the last dinosaur, too old and too stupid

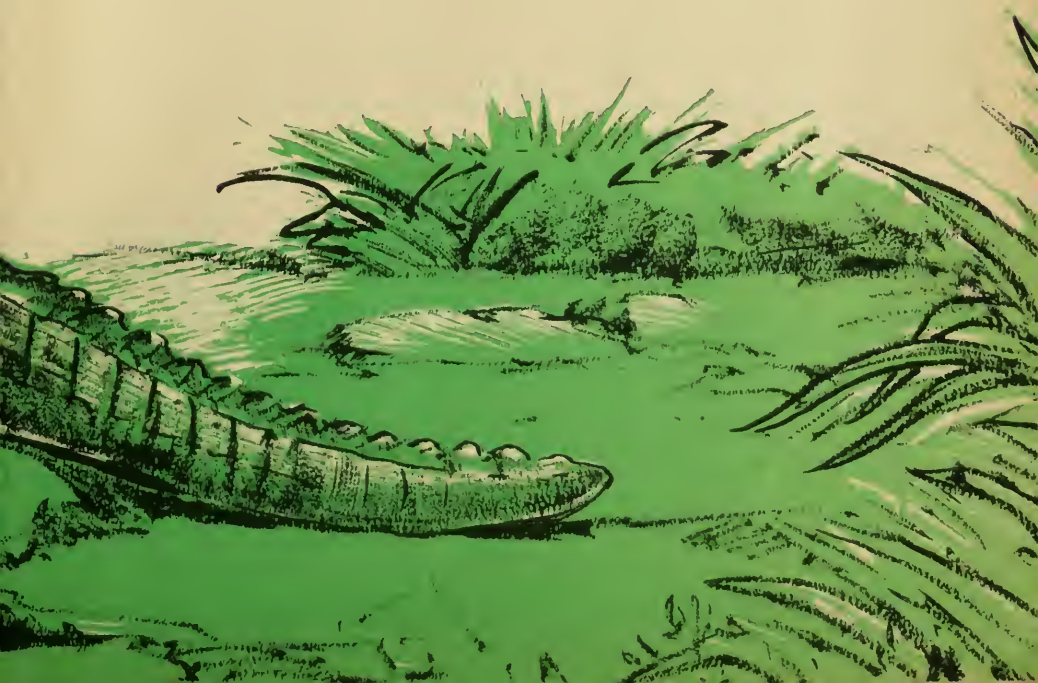
to learn to live on the changed earth, had died. The last flying reptile had sunk into the shrinking sea, leaving the airways to the birds. Most of the sea reptiles died. Now the seas belonged to the fishes.

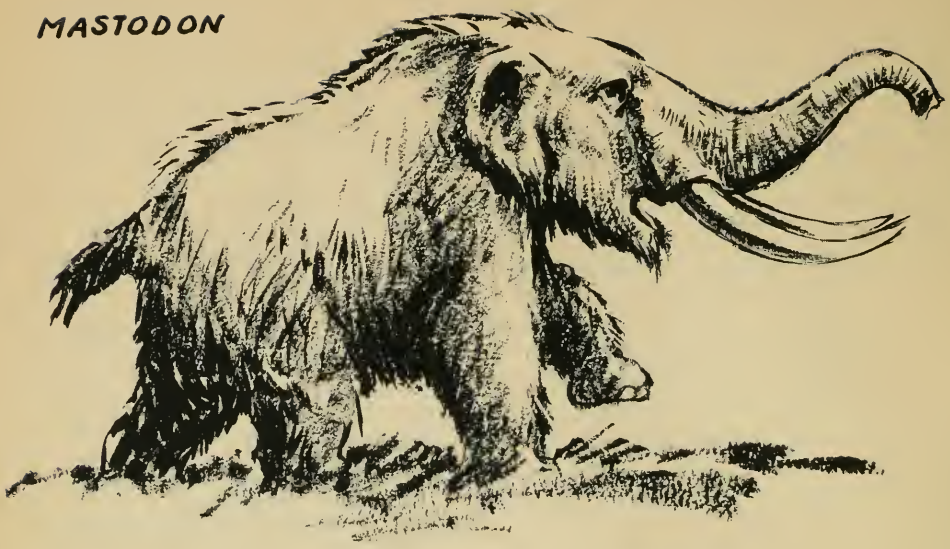
Of the great and mighty tribe of reptiles which had had the earth almost to itself for 140 million years, only a few odds and ends remained: turtles and crocodiles, snakes and lizards, and a meek little animal called tuatara.

Already a new kind of plant had appeared on earth: Grass! In time, over the plain once covered by a sea of water, grew a sea of grass.

Now that they had the earth more to themselves, the mammals crept out of their hiding places. Almost suddenly, as if they had waited too long, they took over the earth.

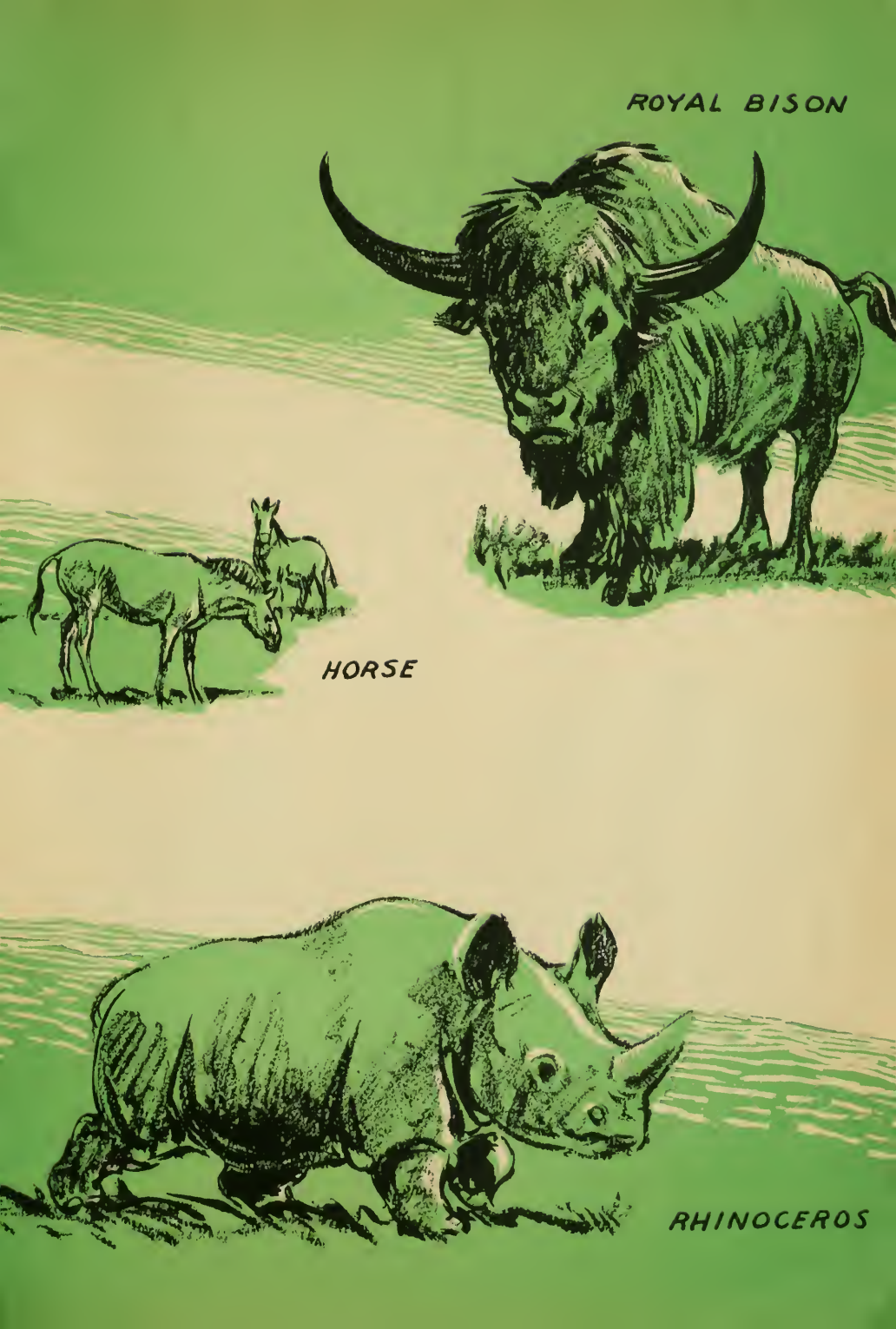
Because of their warm-blooded bodies and their warm fur coats, but most of all because of their intelligence, they lived through the unfriendly cold and drought that wrapped the earth for a time.





Soon there were doglike and catlike animals, rats and mice, and bearlike animals. There were mastodons, rhinoceres and bison. Herds of the early horses, smaller than Shetland ponies, came to graze on the plains.

Wave upon wave of new and different animals kept being born from the older kinds. They ate fruits and nuts, the nourishing grasses, and each other.


ROYAL BISON
HORSE
RHINOCEROS

It was a noisy world. No longer were the winds and the pounding seas the loudest soundmakers. Now the animals barked and howled, snarled and purred, whinnied and chattered and growled. Some of them squeaked.

Almost all of them carried their young inside their bodies until the little ones had grown enough to be born. After birth, they fed on the milk that formed in their mothers' bodies. Their mothers taught them and took care of them. For the first time on earth there was such a thing as a family.

For the first time, too, there was wit in the world. With cunning the animals hunted. With cunning they escaped their enemies.

Then, only a million years ago, a new creature appeared. His name was Man. He brought with him all that the other mammals had, and more. He brought tears and laughter and a great curiosity.

At first he had a savage time of it subduing the ferocious bears and saber-toothed tigers. After that, he explored his world, putting to use everything

he found that would make him more comfortable.

He trained the dog for a friend and tamed the grass for bread. He invented gods and drew pictures on the walls of caves. He made music by thumping on a hollow log. When he had invented the wheel, he put the horse to work. Some time after he had taught himself to talk, he thought of a way to put his talking on clay—and later on paper.

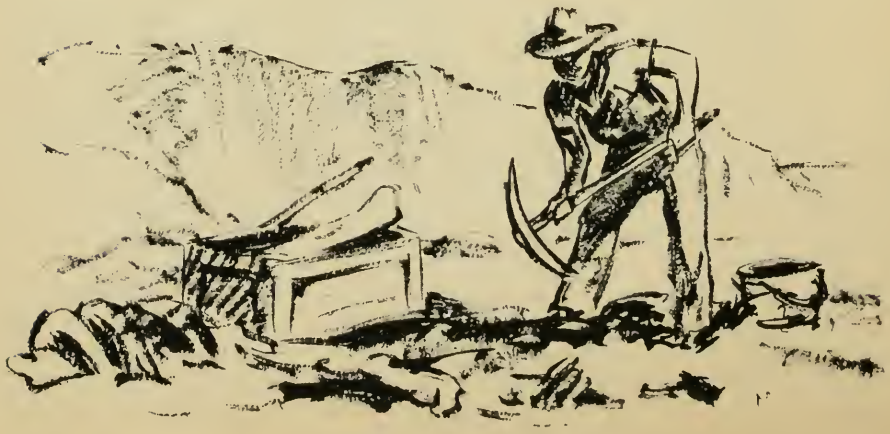
His curiosity would not let him rest. He pried and poked into everything on earth.

Not much more than a hundred years ago, people digging in the earth came upon a strange bone turned to stone. It was part of a prehistoric monster.

Other people, digging in many other places, found whole worlds of ancient animals and plants buried deep in stone. Like a torn-up letter, scientists pieced together everything that was found and saw in it part of the story of the earth long millions of years before human beings appeared.

Then they put some of their finds in museums for everyone to see and wrote books about them for everyone to read.

But they haven't found out about everything. There is much more to learn.



SCHOLASTIC BOOK SERVICES, NEW YORK

Millions of years ago, before there were people, dinosaurs — the giant "lizards" — roamed the plains and forests. Their fossil skeletons tell a strange story — of the flesh-eating Tyrannosaur, of the mighty armored Stegosaurus with the tiny brain, of the Diplodocus, so huge that, as you see here, eleven men aren't a bit crowded under its skeleton!

What was the world like when these monsters stalked the earth?

Denver Mus. Nat. Hist.